microsonic

Operating manual

mic+ Ultrasonic Sensors with one analogue output and two switched outputs

mic+25/DDIU/TC
mic+35/DDIU/TC
mic+130/DDIU/TC
mic+340/DDIU/TC
mic+600/DDIU/TC

Product description

- The mic+ sensor with one analogue output and two switched outputs measures the distance to an object within the detection zone contactless. A signal proportional to distance is created and the switched outputs are set according to the adjusted detect distances.
- The sensor automatically detects the load put to the analogue output and switches to current output or voltage output respectively.
- All settings are done with two push-buttons and a three-digit LED-display (TouchControl).
- Light emitting diodes (three-colour LEDs) indicate the operation conditions.
- Choosing between rising and falling output characteristic as well as output function NOC and NCC is possible.
- The sensors are adjustable manually using the numerical LED-display or may be trained using Teach-in processes.
- Useful additional functions are set in the Add-on-menu.
- Using the LinkControl adapter LCA-2 (optional accessory) all TouchControl and additional sensor parameter settings may be made by a Windows-Software.

Important instructions for ssembly and application

All employee and plant safety-relevant measures must be taken prior to assembly, start-up, or maintenance work (see operation manual for the entire plant and the operator instruction of the plant).

The sensors are not considered as safety equipment and may not be used to ensure human or machine safety!

The mic+sensors indicate a **blind zone**, in which the distance cannot be measured. The **operating range** indicates the distance of the sensor that can be applied with normal reflectors with sufficient function reserve. When using good reflectors, such as a calm water surface, the sensor can also be used up to its **maximum range**. Objects that strongly absorb (e.g. plastic foam) or diffusely reflect sound (e.g. pebble stones) can also reduce the defined operating range.

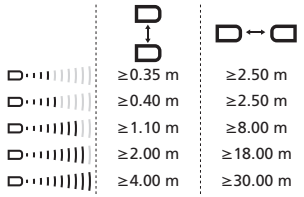


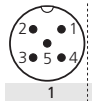
Fig. 1: Minimum assembly distances

Assembly distances

The table below lists the minimum mounting distances between two sensors. Smaler distances should not be used because otherwise the sensors can influence each other, see fig. 1.

Assembly instructions

- Assemble the sensor at the installation location.
- Plug in the connector cable to the M 12 connector, see fig. 2.



		colour
1	$+U_B$	brown
3	$-U_B$	blue
4	D2	black
2	IU	white
5	D1/Com.	grey

Fig. 2: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Start-up

mic+ sensors are delivered factory made with the following settings:

- Rising analogue characteristic
- Window margins for the analogue output set to blind zone and operating range
- Switched outputs on NOC
- Detecting distances at operating range and half operating range
- Measurement range set to maximum range

Set the parameters of the sensor manually or use the Teach-in procedure to adjust the detect points, see fig. 3.

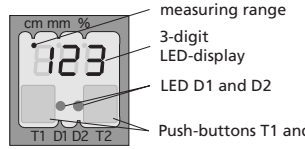


Fig. 3: TouchControl

Operation

mic+ sensors work maintenance free. Small amounts of dirt on the surface do not influence function. Thick layers of dirt and caked-on dirt affect sensor function and therefore must be removed.

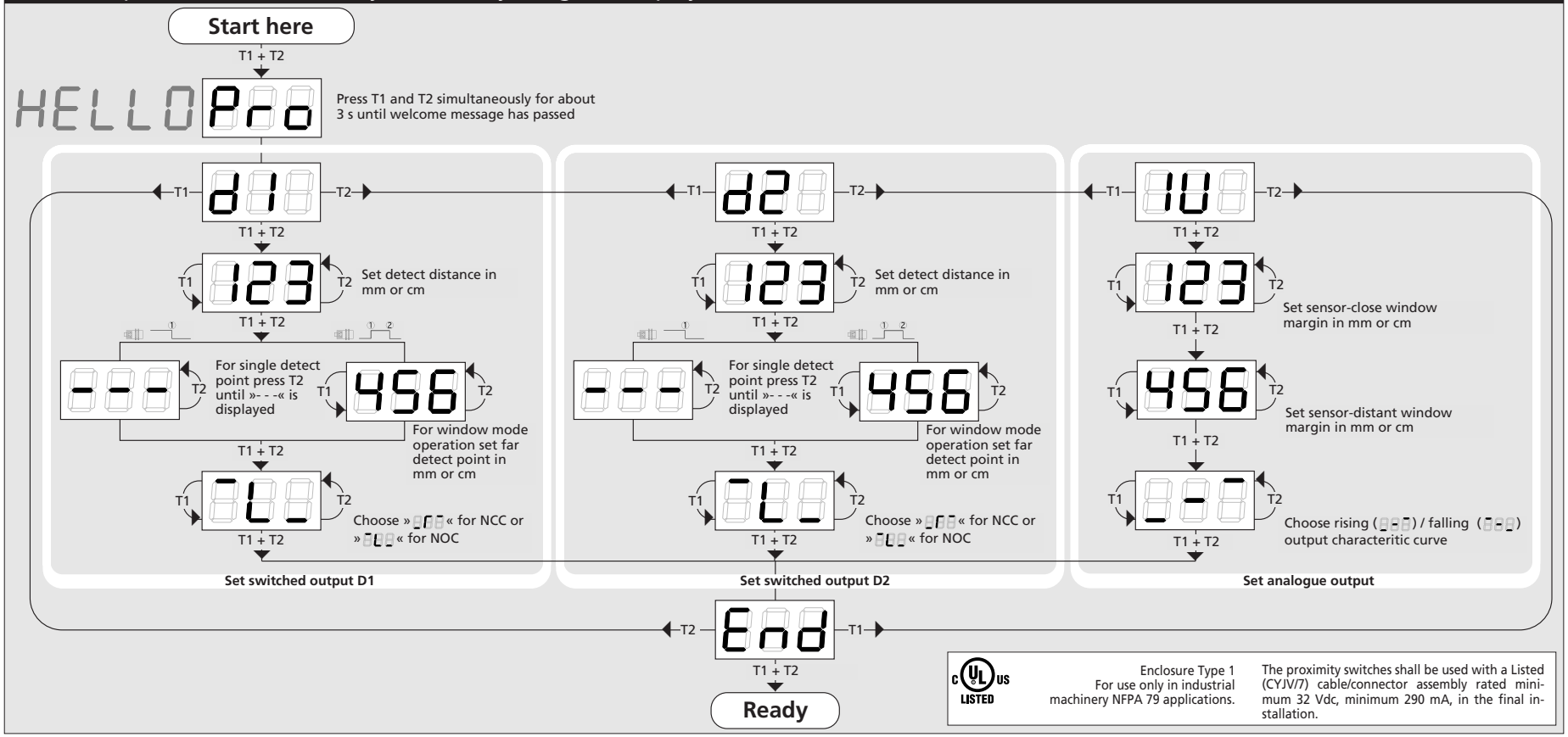
Notes

- mic+ sensors have internal temperature compensation. Because the sensors heat up on their own, the temperature compensation reaches its optimum working point after approx. 30 minutes of operation.
- If the LCA-2 is connected to the mic+ when turning supply voltage on, the sensors starts in communication mode and the switched output on pin 5 of the connector is not available.
- The load put to the analogue output is detected automatically when turning supply voltage on.
- During normal mode operation, a yellow LED signals that the corresponding switched output has connected.
- During normal mode operation, the measured distance value is displayed on the LED-indicator in mm (up to 999 mm) or cm (from 100 cm). Scale switches automatically and is indicated by a point on top of the digits. Alternatively a percentage scale may be set in the add-on menu. In this connection 0% and 100% correspond to the set window margins of the analogue output.
- During Teach-in mode, the hysteresis loops are set back to factory settings.
- In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0-85 % of the set distance.
- If no objects are placed within the detection zone the LED-indicator shows »- - -«.
- If no push-buttons are pressed for 20 seconds during parameter setting mode the made changes are stored and the sensor returns to normal mode operation.

Show parameters

Tapping push-button T1 shortly during normal mode operation shows »PAr« on the LED-display. Each time you tap push-button T1 the actual settings of the analogue output and the switched output are shown.

Set sensor parameters alternatively numerically using LED-display...



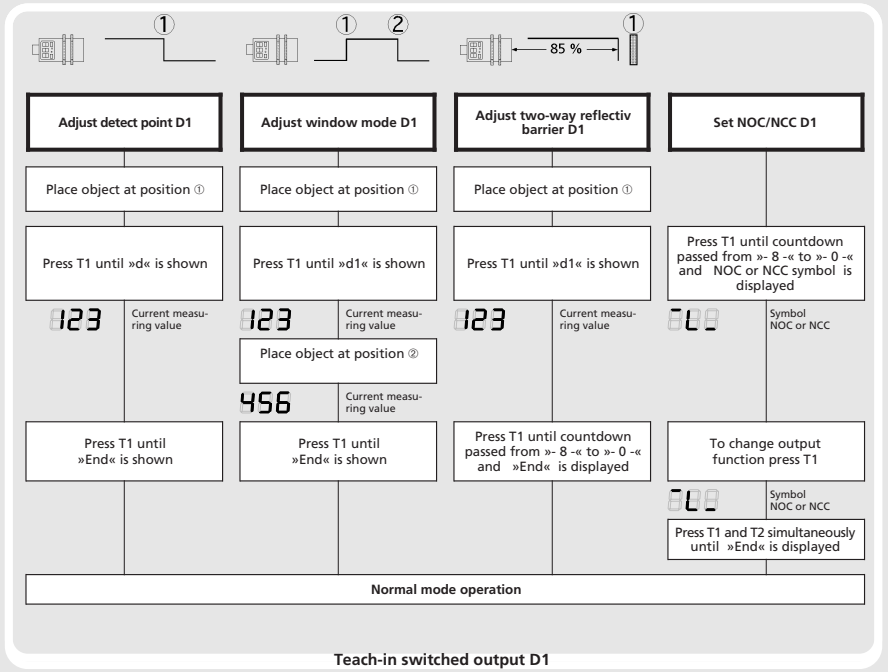
Enclosure Type 1
For use only in industrial machinery NFPA 79 applications.

The proximity switches shall be used with a Listed (CYJV/7) cable/connector assembly rated minimum 32 Vdc, minimum 290 mA, in the final installation.

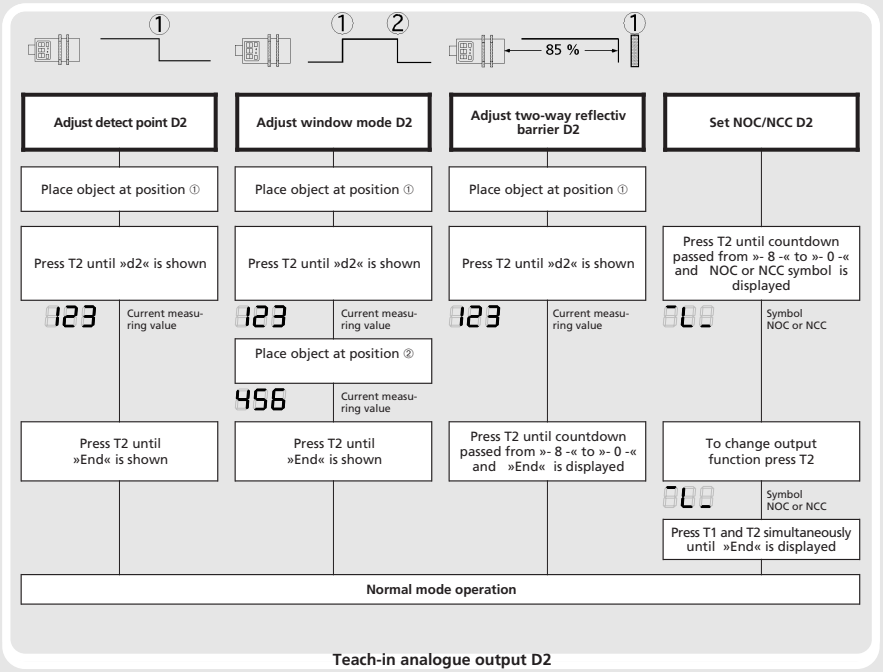
CE

2014/30/EU

...or with the Teach-in procedure

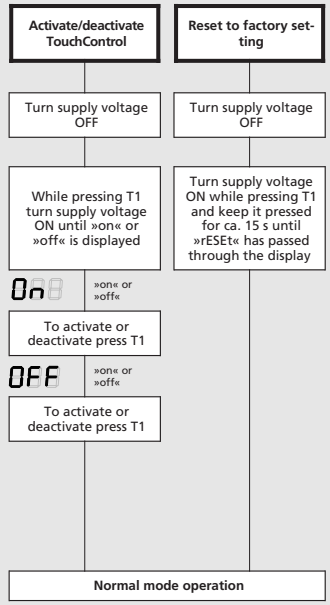


Teach-in switched output D1

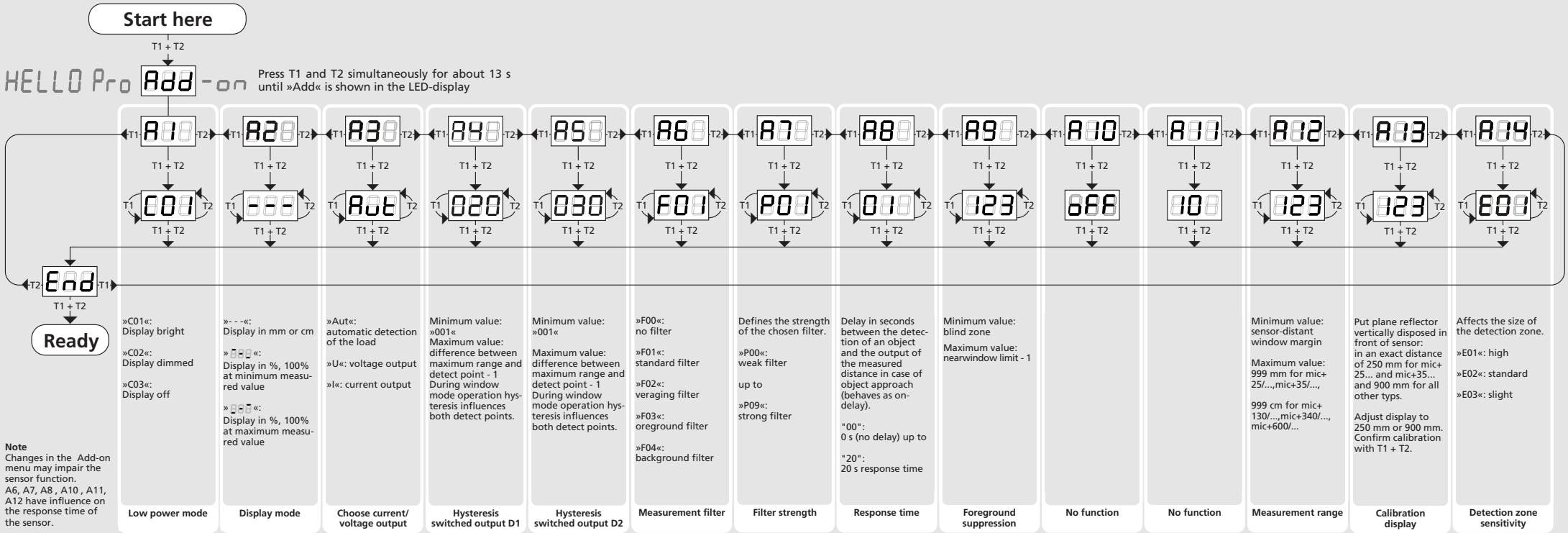


Teach-in analogue output D2

Key lock and factory setting

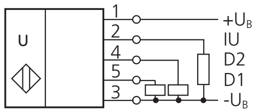


Usefull additional functions in Add-on menu (for experienced users only, settings not required for standard applications)

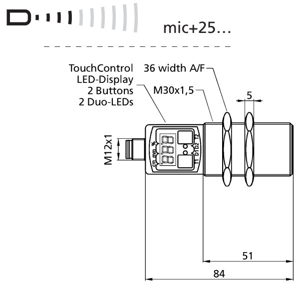
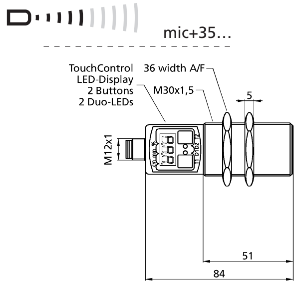
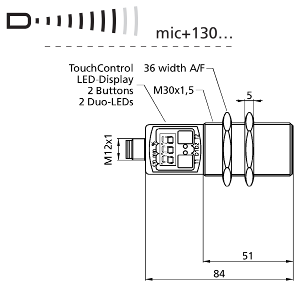
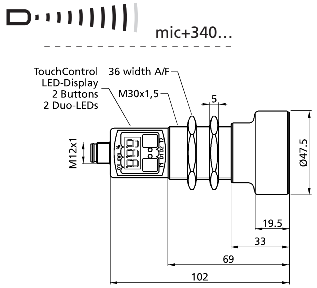
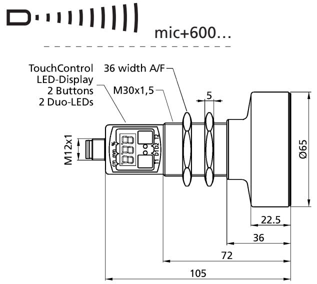
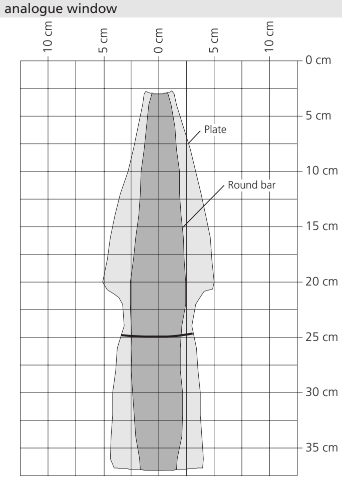
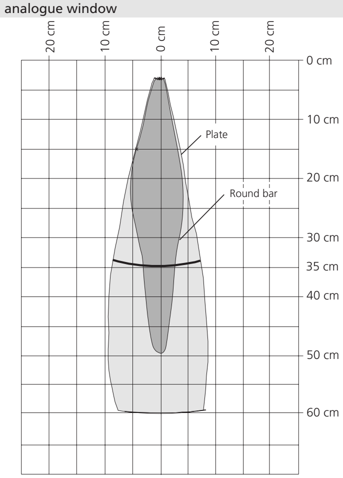
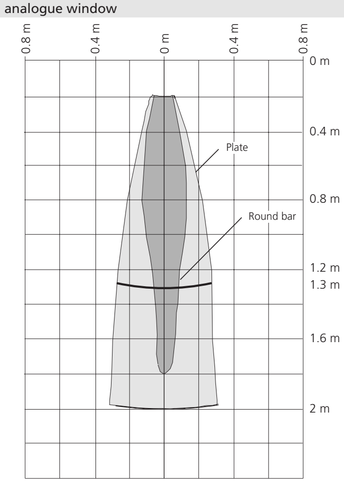
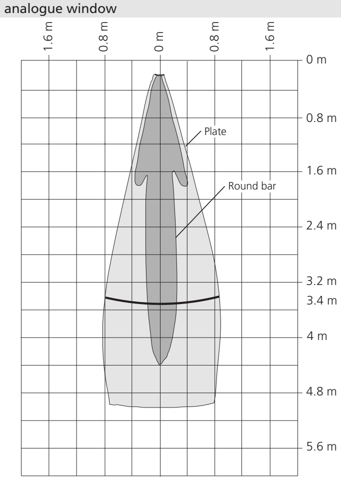
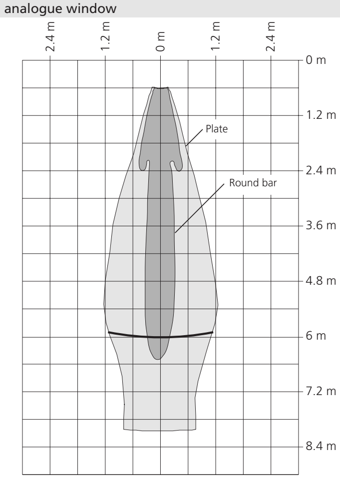


Note
Changes in the Add-on menu may impair the sensor function.
A6, A7, A8 , A10 , A11, A12 have influence on the response time of the sensor.

Technical data



2 pnp switched outputs + analogue output

	mic+25…	mic+35…	mic+130…	mic+340…	mic+600…
					
Blind zone	0 to 30 mm	0 to 65 mm	0 to 200 mm	0 to 350 mm	0 to 600 mm
Operating range	250 mm	350 mm	1.300 mm	3.400 mm	6.000 mm
Maximum range	350 mm	600 mm	2.000 mm	5.000 mm	8.000 mm
Angle of beam spread	Please see detection zone	Please see detection zone	Please see detection zone	Please see detection zone	Please see detection zone
Transducer frequency	320 kHz	400 kHz	200 kHz	120 kHz	80 kHz
Resolution, sampling rate	0.025 mm bis 0.10 mm, depending on the analogue window	0.025 mm bis 0.17 mm, depending on the analogue window	0.18 mm bis 0.57 mm, depending on the analogue window	0.18 mm bis 1.50 mm, depending on the analogue window	0.18 mm bis 2.40 mm, depending on the analogue window
Detection zones for different objects: The dark grey areas are determind with a thin round bar (10 or 27 mm dia.) and indicate the typical operating range of a sensor. In order to obtain the light grey areas, a plate (500 x 500 mm) is introduced into the beam spread from the side. In doing so, the optimum angle between plate and sensor is always employed. This therefore indicates the maximum detection zone of the sensor. It is not possible to evaluate ultrasonic reflections outside this area.					
opperating voltage U_B	9 V to 30 V DC, short-circuit-proof, Class 2	9 V to 30 V DC, short-circuit-proof, Class 2	9 V to 30 V DC, short-circuit-proof, Class 2	9 V to 30 V DC, short-circuit-proof, Class 2	9 V to 30 V DC, short-circuit-proof, Class 2
reproducibility	± 0.15 %	± 0.15 %	± 0.15 %	± 0.15 %	± 0.15 %
accuracy	± 1 % (Temperature drift internal compensated, may be deactivated[1], 0.17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated[1], 0.17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated[1], 0.17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated[1], 0.17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated[1], 0.17%/K without compensation)
Voltage ripple	±10 %	±10 %	±10 %	±10 %	±10 %
No-load supply current	≤ 80 mA	≤ 80 mA	≤ 80 mA	≤ 80 mA	≤ 80 mA
Housing	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Class of protection to EN 60529	IP 67	IP 67	IP 67	IP 67	IP 67
Norm conformity	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Type of connection	5-pin initiator plug, PBT	5-pin initiator plug, PBT	5-pin initiator plug, PBT	5-pin initiator plug, PBT	5-pin initiator plug, PBT
Controls	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)
Indicators	3-digit LED-display, 2 three-colour LEDs	3-digit LED-display, 2 three-colour LEDs	3-digit LED-display, 2 three-colour LEDs	3-digit LED-display, 2 three-colour LEDs	3-digit LED-display, 2 three-colour LEDs
Programmable	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl
Operating temperature	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C
Storage temperature	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Weight	150 g	150 g	150 g	210 g	270 g
Switching hysteresis[1]	3mm	5 mm	20 mm	50 mm	100 mm
switching frequency[1]	11 Hz	8 Hz	6 Hz	3 Hz	2 Hz
Response time[1]	50 ms	70 ms	110 ms	180 ms	240 ms
Time delay before availibility	< 300 ms	< 300 ms	< 300 ms	< 380 ms	< 450 ms
Order No.	**mic+25/DDIU/TC**	**mic+35/DDIU/TC**	**mic+130/DDIU/TC**	**mic+340/DDIU/TC**	**mic+600/DDIU/TC**
Switched output	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof
Current output 4 – 20 mA	$R_L \le 100\,\Omega$ at $9\,V \le U_B \le 20\,V$; $R_L \le 500\,\Omega$ at $U_B \ge 20\,V$ Rising/falling output characteristic	$R_L \le 100\,\Omega$ at $9\,V \le U_B \le 20\,V$; $R_L \le 500\,\Omega$ at $U_B \ge 20\,V$ Rising/falling output characteristic	$R_L \le 100\,\Omega$ at $9\,V \le U_B \le 20\,V$; $R_L \le 500\,\Omega$ at $U_B \ge 20\,V$ Rising/falling output characteristic	$R_L \le 100\,\Omega$ at $9\,V \le U_B \le 20\,V$; $R_L \le 500\,\Omega$ at $U_B \ge 20\,V$ Rising/falling output characteristic	$R_L \le 100\,\Omega$ at $9\,V \le U_B \le 20\,V$; $R_L \le 500\,\Omega$ at $U_B \ge 20\,V$ Rising/falling output characteristic
Voltage output 0 – 10 V	$R_L \ge 100\,k\Omega$ at $U_B \ge 15\,V$, short-circuit-proof Rising/falling output characteristic	$R_L \ge 100\,k\Omega$ at $U_B \ge 15\,V$, short-circuit-proof Rising/falling output characteristic	$R_L \ge 100\,k\Omega$ at $U_B \ge 15\,V$, short-circuit-proof Rising/falling output characteristic	$R_L \ge 100\,k\Omega$ at $U_B \ge 15\,V$, short-circuit-proof Rising/falling output characteristic	$R_L \ge 100\,k\Omega$ at $U_B \ge 15\,V$, short-circuit-proof Rising/falling output characteristic

1) Can be programmed with TouchControl and LinkControl

MV-DO-096623-623626